

## **REMARKS/ARGUMENTS**

### **I. Status of the Claims**

Claims 1-11 are pending. Claim 7 has been amended in order to address informalities. Claim 12 has been added. Support for the amendment may be found, for example, with reference to Example 1 as provided in Applicants' Specification, as published in U.S. Pub. No. 2007/0142220 at page 6 and at paragraph 110 at page 6.

Reconsideration of the pending claims in view of the following remarks is respectfully requested. No new matter is added by way of the present amendments.

### **II. Rejections under 35. U.S.C. § 103**

Claims 1-11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Kashiwa et al. (US 4,071,674) in view of Kioka et. al. (US 4,330,649). The Examiner contends that Kashiwa discloses a process to prepare a catalyst for olefin polymerization that comprises the steps of reacting a titanium compound with the product formed by a reaction between a magnesium dihalide solid carrier with an aliphatic or aromatic C<sub>1-12</sub> alcohol and an organometallic compound with an organometallic compound catalyst component. The Examiner admits that Kashiwa does not require a halogenating step.

The Examiner further contends that Kioka discloses a process to prepare a catalyst comprising the contact of a solid titanium catalyst containing magnesium, titanium, halogen and an electron donor, where the catalyst component is the product of a magnesium compound having no reducing ability with a halogen containing titanium compound in the presence of an electron donor having an active hydrogen and an organometallic compound of

a metal selected from the groups consisting of metals of Groups I to III of the periodic table. Furthermore, the Examiner states that Kioka discloses that it is not desirable to use a large amount of a compound having reducing ability together for the titanium catalyst component. Based on this insight, the Examiner contends, based on the specification, that it would have been obvious to one of ordinary skill in the art at the time the invention was made to halogenate the contact product of magnesium dihalide, alcohol, and dialkylmagnesium in Kashiwa.

Applicants respectfully traverse the rejection.

Step (c) of Applicants' invention as claimed in independent claim 1 reacts a magnesium titanium complex with an electron donor. This step is necessary to inhibit the formation of active sites which cause the production of a polymer having a low molecular weight among non-uniform active sites. As a result of the inhibition of the formation of these active sites, the amount of wax component extracted by the polymerization solvent is low and the polymer and polymer particles do not agglomerate. This can be seen, for example, from the comparison of Examples 1 and 2 to Comparative Examples 1 and 2 in Applicants' Tables 2 and 6, respectively. The amount of hexane-extracted component is drastically differentiated according to whether an electron donor is used or not. In the process disclosed by Kashiwa, there are no comparable electron donor groups or organic ester groups that could provide donor electrons as provided for by Applicants' claimed process.

Applicants submit that combining of Kioka with Kashiwa as suggested by the Examiner in order to remedy to the lack of electron donors in Kashiwa would nevertheless teach a method that is materially different from Applicants' invention. Applicants' invention

utilizes slurry polymerization. Bulk density is a property used to predict the uniformity of morphology of polymerized particles. Particles are more uniform as the value of bulk density is increased. A comparison of Applicants' Examples 1 and 5 to Comparative Examples 1 and 2 shows that bulk density is considerably improved by treating organic magnesium and alkylhalide or halogensilane compounds *prior* to preparing the titanium compounds and then reacting the titanium-magnesium compound with an the electron donor group. (Specification, Tables 2, 4 and 6.) Kioka does not use this method to create its catalyst.

Kioka teaches reacting a magnesium compound with a titanium compound already containing halogen. This is opposite to Applicants' approach. Kioka recognizes that "the solid titanium catalyst component varies greatly in properties depending upon the method of its preparation." As shown above, Applicants' invention has an improved bulk density; and, as stated in Kioka, the difference in steps in preparation of the catalysts (for example, as between Applicants' invention and Kioka) can greatly vary the properties of the catalyst. Therefore, even when Kioka and Kashiwa are combined, they do not teach a process that will improve bulk density in the polymers, because they do not treat organic magnesium and alkylhalide or halogensilane compounds prior to preparation of the titanium compounds as is evidenced in Applicants' invention.

Furthermore, the method in Kioka includes unnecessary steps for preparing the catalyst, and uses an environmentally problematic method to do so. Kioka discloses that the catalyst is prepared by reacting carbon tetrachloride with an electron donor between two or four times. This method requires extra time for preparing the catalyst as compared to Applicants' invention. Moreover, Kioka's method uses carbon tetrachloride in an excessive

amount. Carbon tetrachloride has severe adverse health effects and has been banned in consumer products. The purpose of Applicants' invention was to overcome complicated preparation procedures and environmental problems. (Specification, p. 1, paragraph 9). Therefore, because Kioka uses more steps and an environmentally problematic compound, it combined with Kashiwa would not work the same as Applicants' invention.

For at least these reasons, Applicants respectfully submit that independent claim 1 is not obvious and stands in condition for allowance; and, as the other claims depend from claim 1, they are also allowable.

**CONCLUSION**

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

The Examiner is respectfully requested to contact the undersigned at the telephone number indicated below once he has reviewed the proposed amendment, if the Examiner believes any issue can be resolved through either a Supplemental Response or an Examiner's Amendment.

Dated: August 25, 2008

Respectfully submitted,

By 

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